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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/555,156	11/02/2005	Naoki Fujiwara	14321.81	3941

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EXAMINER	
PARK, KINAM	

ART UNIT	PAPER NUMBER
2828	

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12/19/2008	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/555,156	FUJIWARA ET AL.	
	Examiner	Art Unit	
	KINAM PARK	2828	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *14 October 2008*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *12,13,15,16,18,20-23,29-32,35-39 and 43-45* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *12-13, 15-16, 18, 20-23, 29-32, 35-39, and 43-45* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

1. Examiner acknowledges and accepts amendments made to claims, filed on October 14, 2008:

Claims 12-13, 15-16, 18, 20-23, 29-32, 35-39, and 43-45 are pending; and

Claims 43-45 have been added.

Response to Arguments

2. Applicant's arguments, filed on October 14, 2008, have been fully considered but they are not persuasive.

Applicant's arguments on pages 10-16,

1) pertaining to claims 12, 29, and 35, where applicant submits that Contrary to the implication of the Office Action, nowhere in this portion of Fujiwara, nor in the cited equations 1, 2, and 5 of Fujiwara, is there any disclosure or suggestion that "according to an increase or decrease in the DBR control current, a refractive index of said active region optical waveguide equally decreases or increases, respectively, in accordance with a refractive index of the first DBR region and the second DBR region such that a ratio of the lasing wavelength shift quantity is maintained in a range from 0.9 to 1.1," as generally recited in claims 12, 29, and 35.

However, it is the examiner's interpretation that Fujiwara et al. disclose in formula (1), (2), (5) and specification that the formulas (2) shows that a refractive index of said active region optical waveguide equally decreases or increases according to an increase or decrease in the DBR control current and mode-hope-free tuning range (see,

formula (5)) is established based on the formula, $n_{eff\text{-}DBR} = n_{eff\text{-}ACT}$, which leads to the following limitation, i.e., "in accordance with a refractive index of the first DBR region and the second DBR region such that a ratio of the lasing wavelength shift quantity is maintained in a range from 0.9 to 1.1."; thereby the argument of this limitation is not persuasive.

2) pertaining to claims 12, 29, and 35, where applicant argues that accordingly, the assumption used in Fujiwara that $A_{neq\text{-}ACT}=0$, apparently denotes that the equivalent refractive index of the active region is NOT changed according to an increase or decrease in the DBR control current in Fujiwara..

However, it is the examiner's interpretation that the assumption used in Fujiwara that $A_{neq\text{-}ACT}=0$ is used to show that the cavity modes shifts slower than the Bragg wavelength (see, p. 1133, left section, lines 7-8 of Fujiwara et al.); thereby the argument of this limitation is not persuasive.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

4. Claims 12-13, 15, 18, 21, 23, 30-32, 34, 36-38 are rejected under 35 U.S.C. 102(b) as being anticipated by Fujiwara et al. (cited as 8 of IDS, filed on 12/28/2006).

Regarding **claim 12,**

Fujiwara et al. discloses in figure 1 and specification:

12. A wavelength tunable distributed Bragg reflector (DBR) laser having optical waveguide surrounded by a clad layer on a substrate, comprising;

a first passive region optical waveguide (see, Passive Layer) including a first DBR region having a diffraction grating in a section whose length corresponds to effective length of 95% or more of the saturated effective length value of the first DBR regions(see, figure 3 & 4), wherein the lasing wavelength is controlled by a DBR control current (see, I_{DBR}),

a second passive region optical waveguide (see, Passive Layer) including a second DBR region having a diffraction grating in a section whose length corresponds to an effective length of 75% or less of the saturated effective length value of the second DBR region (see, figure 3 & 4), wherein the lasing wavelength is controlled by the DBR control current (see, I_{DBR}), and said length of the second DBR region is within a range where the effective length of the second DBR region increases/decreases lineally in relation to the length of the second DBR region (see, in figure 3, the linearity in the range of an effective length of 75% or less of the saturated effective length value), and

an active region optical waveguide (see, Active Layer) in which the first passive region optical waveguide and the second passive region optical waveguide are optically connected at both ends, wherein emission state is controlled by the active region current (see, I_{ACT}), irrespective of the DBR control current.

wherein according to an increase or decrease in the DBR control current, a refractive index of said active region optical waveguide equally decreases or increases

(see, (1) and (2), right section, p. 1132), respectively, in accordance with a refractive index of the first DBR region and the second DBR region such that a ratio of the lasing wavelength shift quantity to the Bragg wavelength shift quantity is maintained in a range from 0.9 to 1.1 (see, left section, (5), line 15, p. 1133).

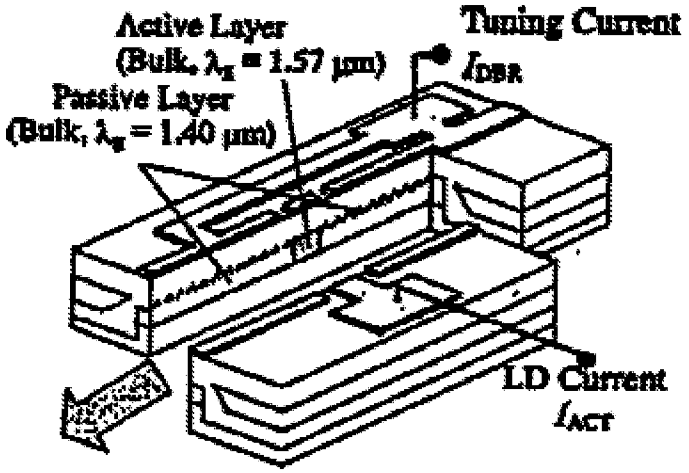

Fig. 1. Schematic structure of the mode-hop-free DBR laser.

Regarding **claim 13, 15, 18, 21, 23, 30-32, 36-38,**

Note that Fujiwara et al. discloses in figure 1 and specification a first electrical isolating region and a second electrical isolating region (see, the separation of electrode) (**claim 13, 30,36**), the length of active region in a range from 30 μm to 100 μm (see, figure 5) (**claim 15, 18, 21, 23, 31-32, 37-38**).

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

6. Claim 16, 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fujiwara et al. in view of Chraplyvy et al. (US 4905253).

Regarding **claim 16, 20,**

Fujiwara et al. discloses the limitations of claim 12, 13 for the reasons above.

However, Fujiwara et al. is silent as to an ant-reflection film on end face of the passive region optical waveguide.

Chraplyvy et al. discloses an anti-reflection coating to two end faces (see, col.5, lines 29-31).

Therefore, it would have been obvious to a person of ordinary skill in the art at the time of invention to combine the an anti-reflection coatings to two end faces of Chraplyvy et al. with a wavelength tunable DBR laser of Fujiwara et al because this provides the at least two end facets to reduce end facet reflections to a minimum (see, col.5, lines 29-31 of Chraplyvy et al.).

7. Claim 22, 39 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fujiwara et al. in view of Ikeda et al. (US 4993036).

Regarding **claim 22, 39,**

Fujiwara et al. discloses the limitations of claim 12, 35 for the reasons above.

Fujiwara et al. also discloses in figure 12, an optical coupler 9see, MMI) and an optical semiconductor amplifier (see, SOA).

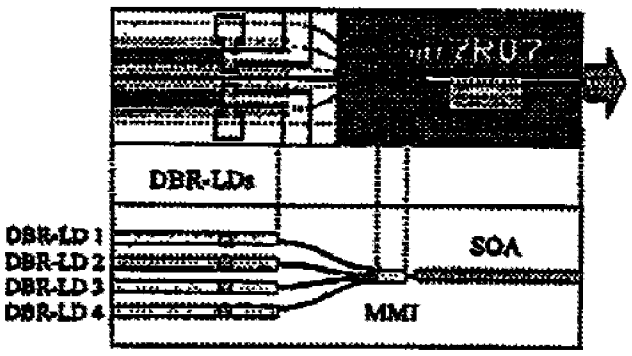

Fig. 12. Structure of the 4-ch mode-hop-free DBR laser array.

However, Fujiwara et al. is silent as to the plurality of wavelength tunable DBR laser having different pitches of the diffraction grating.

Ikeda et al. discloses the diffraction grating with different grating (see, col.1, lines 15-22).

Therefore, it would have been obvious to a person of ordinary skill in the art at the time of invention to combine the diffraction grating with different grating of Ikeda et al. with a wavelength tunable DBR laser of Fujiwara et al because this provides a plurality of laser light beams having different wavelengths (see, col.1, lines 15-22 of Ikeda et al.).

Regarding **claim 29, 35,**

Fujiwara et al. discloses the limitations of claim 12 for the reasons above and the effective length of 75% or less in a saturated effective length for the a first and a second passive region is rejected for the same reason applied above rejected claim 15. A high-reflection film coating an end face of the first passive region and the configuration having one passive region (**claim 35**) is obvious in this art since a high-reflection film

coating provides further improvement in terms of output power and efficiency and threshold power by the enhancement of grating reflectance and the configuration having one passive region is the another example as a DBR laser.

Regarding **claim 43-45,**

The decrease or the increase in said refractive index of said active region optical waveguide respectively caused by an increase or a decrease in a threshold current of the active region optical waveguide (claims 43-45) is obvious in this art since the threshold current of the active region optical waveguide is related with the change of carrier density which leads to the change of the refractive index.

Conclusion

8. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Bendett et al. (US 6636678) discloses the method and apparatus for waveguide optics and devices.

9. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any

extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kinam Park whose telephone number is (571) 270-1738. The examiner can normally be reached on from 9:00 AM-5:00 PM. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, **MINSUN HARVEY**, can be reached on (571) 272-1835. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

/K. P./

Examiner, Art Unit 2828

/Minsun Harvey/

Supervisory Patent Examiner, Art Unit 2828